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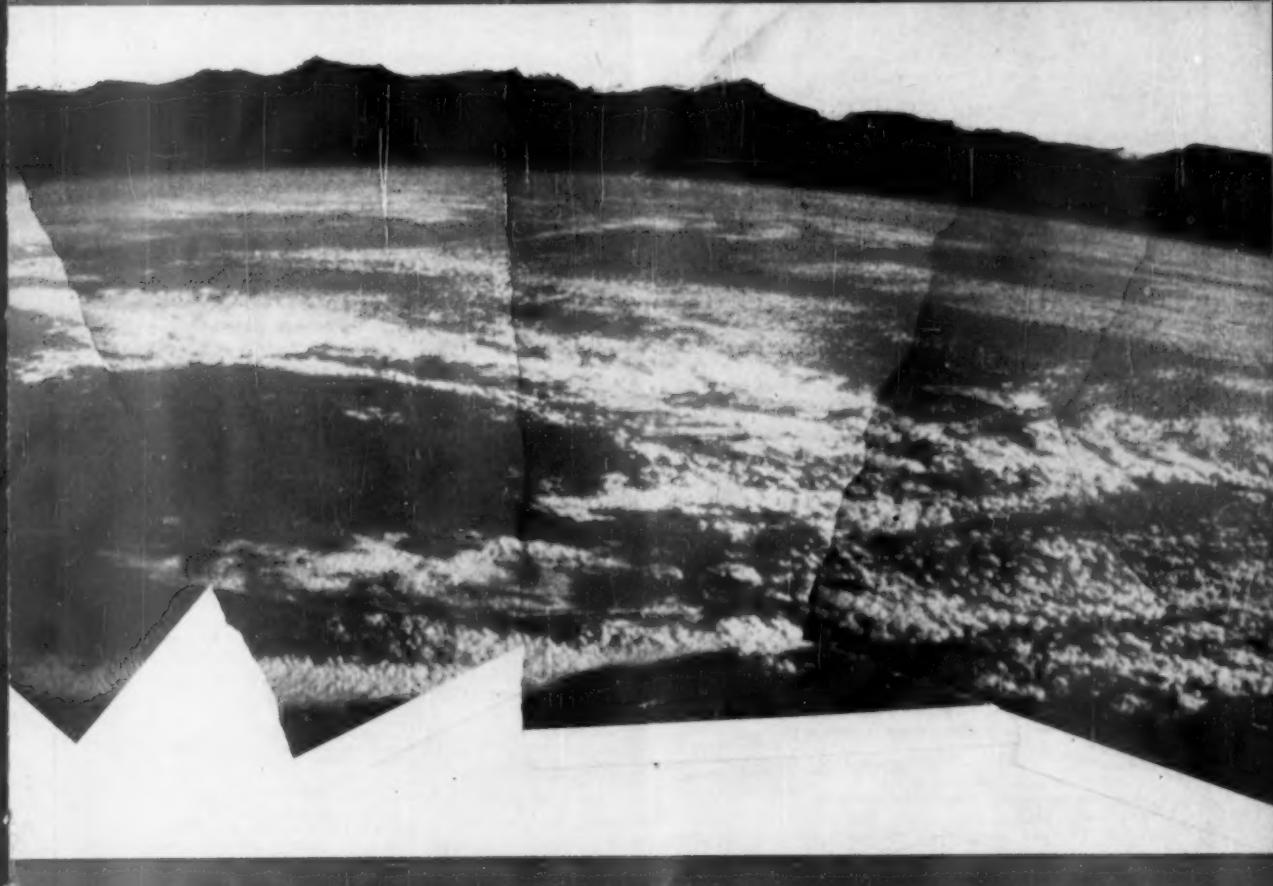
January 17, 1959

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PAGES 33-48

# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

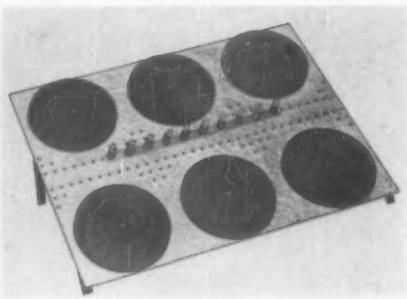


Cloud Mosaic

See Page 31

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## METEOROLOGY

# Long-Range Weather

**A new method for long-range weather forecasting, based on a mathematical model and using a computer, gives meteorologists hope for accurate prediction.**

► A WAY TO PREDICT weather patterns several weeks in advance has been discovered. An electronic computer and newly solved basic equations of atmospheric motion are the essential ingredients.

When fully worked out, the method will give a much more detailed description of long-range weather than now possible. Such a forecast might read: East Coast residents can expect generally clear skies and colder than normal days during the period from Feb. 17 to 21. However, it will not predict the weather for a specific city on a specific day 30 days in the future.

Nevertheless, the method will yield considerably more specific forecasts than the present 30-day ones. These predict only whether temperatures and precipitation for differing regions will average above or below normal for the period involved. Even such limited forecasts have been invaluable aids to the Government, business and the public, and saved unknown millions of dollars yearly.

Dr. Joseph Smagorinsky, chief of the Weather Bureau's general circulation research section, reported his success with the computer forecasts at the American Association for the Advancement of Science meeting in Washington. He told SCIENCE SERVICE the experimental predictions had been carried 35 days in the future and were being continued.

Dr. Smagorinsky said it took the computer approximately three hours to complete a forecast for one day, even though the

mathematical model used was a simplified one in which atmospheric motions are plotted only at two levels, about 8,000 and 35,000 feet above the earth's surface.

He said the mathematical model had originally been devised only to give long-term trends in weather patterns. However, when numerical solutions were worked out by the computer, the method also yielded some details, such as the presence of frontal structures.

Dr. Smagorinsky said the development gave meteorologists, for the first time, a "firm base for constructing realistic models" of atmospheric behavior. He reported that his mathematical model uses basic hydrodynamic equations never before previously solved successfully. The equations are set up to simulate the vertical structure of the atmosphere in a simple fashion.

Success in doing this, he said, now allows meteorologists to deal with much more complex atmospheric models.

Dr. Smagorinsky said work was now underway to improve the present method, including a separate attack on the problem of predicting precipitation several weeks in the future. Another problem due for investigation is the effects of changes in the sun's output on earthly weather.

He estimated that within three years he would be able definitely to determine how much influence the sun's radiation has on weather and the nature of this influence.

When the mathematical model is permitted to evolve in the same way the

atmosphere would, Dr. Smagorinsky said it yielded energy transformations that quite closely resemble the observed transfer of heat from equatorial to polar regions.

The atmosphere, he explained, seems to possess an inherent cycle that meteorologists have termed the index cycle. This is the period required for the general characteristics of atmospheric motion to change and then reach another stable pattern.

At one point in the index cycle, atmospheric flow is zonal, or relatively parallel to the equator. This pattern gradually breaks down until large troughs and ridges are formed and the atmosphere is comparatively turbulent. A change from a high index cycle, when the weather is usually fair in middle latitudes, to a low index cycle, when storminess is rampant, can take anywhere from one to six weeks.

Dr. Smagorinsky said his mathematical model worked out for all regions of the Northern Hemisphere from the equator to the pole. Previous models of the general circulation have hit snags in predicting weather developments for equatorial regions.

He said the present development was an outgrowth of pioneering work on numerical weather prediction done by the late Dr. John von Neumann, Drs. Jule Charney and Norman A. Phillips, now of Massachusetts Institute of Technology, while at the Institute for Advanced Study, Princeton, N. J.

Science News Letter, January 17, 1959

## GEOLOGY

## Arctic Tunnel Built To Test Ice Movement

► A TUNNEL 1,150 feet long has been carved out of the Arctic ice to test the properties of snow and ice in order to obtain information needed to help men build, live and work in the polar regions.

The tunnel was built by U. S. Army Corps of Engineers scientists, using modern coal mining machinery. In its large connecting rooms under the Arctic ice cap, experiments on ice movement and other research will be conducted by scientists from the Snow, Ice and Permafrost Research Establishment, called SIPRE, Wilmette, Ill.

The project will enable scientists to determine how much the ice closure caused by the gradual movement of ice can be reduced from that recorded in previous tunnels built in the ice cap. In 1956 and 1957 the closure was more than a foot per year.

Scientists from the SIPRE laboratories have estimated that closure rate in the new tunnel will be about six inches per year, since it is built nearer the surface of the ice cap. Entrance to the tunnel, which is located 110 feet below the ice cap surface, is about 60 feet higher than previous entrances.

A continuous coal miner, a machine that cuts the ice and automatically loads it onto a conveyor belt to transport the chopped ice out of the tunnel, was used to build the tunnel.

Science News Letter, January 17, 1959



**ICE TUNNEL**—A 1,150-foot experimental ice tunnel with large connecting rooms under the Arctic ice cap has been carved out by the U. S. Army Corps of Engineers scientists. The tunnel entrance is 15 feet by 15 feet; three rooms, presently 7½ feet from floor to ceiling, 21 feet wide and from 200 to 300 feet long, are reached by connecting tunnels extending out from the main tunnel at 45 degree angles.

## GEOPHYSICS

# More Ice Covers Earth

**Results of International Geophysical Year research indicate that the earth is covered with 40 percent more ice than previously estimated, also that Antarctica may be divided.**

► THE EARTH is covered with 40% more ice than was previously estimated, Dr. Hugh Odishaw, executive director of the U.S. National Committee for IGY, has reported.

In the second of a two-part summary on the findings of the International Geophysical Year, which ended Dec. 31, 1958, Dr. Odishaw says present measurements indicate the world contains some 4,500,000 cubic miles of ice. This revised value is based on various determinations of ice thickness made in Antarctica, where 90% of the world's ice is estimated to be.

Other findings from the IGY program reported in *Science* (Jan. 2), include:

The annual mean temperature at Little America has warmed approximately five degrees in 50 years, while the warming at Spitzbergen in the Arctic is twice as great.

Observations from an Arctic ice floe show the greenhouse effect caused by overcast skies brings much more rapid melting of ice than clear sunlit skies.

Seismic soundings in the Andes suggest the lighter rock characterizing the mountains extends downward in a relatively fine network of supporting roots that penetrate the earth's crust deep into the mantle below.

Seismic measurements at sea reveal the thinnest and thickest earth crusts beneath the seas yet detected: four kilometers and 15 kilometers, or about two and a half and nine miles, respectively.

Correlation of heat flow measurements at the ocean bottom with the location of submarine ridges suggests that the latter are formed by great convection currents in the earth's interior.

These force up sections in the ocean floor, at the same time depressing the neighboring crust.

Several discoveries increase the possibility that Antarctica may be divided in two. These include discovery of a sub-sea-level trough trending inland from Ellsworth Station, another trough on the opposite side of the continent trending inland from the Ross Sea and a deep basin in Marie Byrd Land.

Seismic stations set up in the Antarctic, especially one located at Wilkes Station across the continent from the tip of South America, will permit scientists recording the passage of earthquake shocks to determine if the Antarctic structure is essentially continental or oceanic.

Science News Letter, January 17, 1959

notion that all these bodies orbited the earth. They were right about the moon, but that was probably good luck.

Dr. Price's deciphering of the inscriptions is in its preliminary stages and he does not yet know whether the Greeks were computing orbits of the outer planets. He said the machine is so corroded and delicate that it must be "handled like a snowflake." The corrosion has reduced the metal to piles of metallic salts on which the inscriptions can be seen in reverse.

"Fortunately," he said, "it was partially preserved by the sea water. It would not have survived on dry land."

Science News Letter, January 17, 1959

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## ENGINEERING

# Find Ancient Computer

An ancient machine, once bronze or brass, corroded yet still recognizable, is believed to have been used to compute planetary orbits as early as 65 B.C.

► AN EXTREMELY complex 2,000-year-old computing machine, found in a dusty storage room in a Greek museum, may place that ancient civilization only one technological step behind our own.

The machine, made of bronze or brass and in a highly corroded state now, is believed to have been used to compute planetary orbits as early as 65 B.C.

It contains complicated groupings of gears, a series of calibrations and Greek inscriptions explaining the theory of the machine and cycles of the sun and moon.

The find was made by Dr. Derek J. Price of the Institute for Advanced Study at Princeton University. He is a science historian specializing in ancient instruments.

Dr. Price, a Briton, told SCIENCE SERVICE at the American Association for the Advancement of Science meeting in Washington that ten years ago he ran across a vague reference to the machine. For the first time in 1958 he was able to visit the National

Museum in Athens to see its "remains" in the storage room.

The device was originally discovered in 1900 by a group of Greek sponge divers off the island of Antikythera who had happened upon a sunken ship laden with marble and bronze statuary. Although the find was published, little significance was attached to the machine.

He said the find was "like opening a pyramid and finding the atom bomb."

He claimed it is the kind of technological achievement that probably no one in our civilization could have done until men of the Edison ilk came along.

"The Greeks were at the peak of their civilization at the time this machine was made," he said. "And they were not far behind where we are now."

Although the Greeks believed the earth was round and knew of the existence of Mercury, Venus, Mars, Jupiter and Saturn as well as the sun and moon, they had the

## PUBLIC HEALTH

# Agree on Fluoridation

**The majority of Americans queried on the question believe fluoridation is beneficial, yet only one in three persons using public water supplies is receiving fluoridated water.**

► AMERICANS who think fluoridated water is beneficial outnumber those who do not by three to one. Yet, fluoridated water is provided to only one of every three using public water supplies, facts compiled by the United States Public Health Service show.

Fluoridation as a measure effective in preventing 60% to 70% new tooth decay was approved by the U. S. Public Health Service in 1951 after 20 years of research and testing. Today, every major scientific and professional organization concerned with health has approved fluoridation and attested to its safety, effectiveness and practicability.

Dr. Donald J. Galagan, chief assistant in the division of dental public health at the U. S. Public Health Service, cites a recent national poll taken in the U. S. in 1957 that shows 53% of the people think that fluoridation is beneficial. It was an Elmo Roper Poll.

Eighteen percent of those polled think it is not good, while 29% admitted that they do not know anything about this important health measure.

Despite this three-to-one ratio, municipal battles over fluoridation have been violent. Fluoridation has been defeated in local referendums more often than it has been approved, Dr. Galagan said. He feels that such referendums do not necessarily reflect what the majority want. Secretary Arthur S. Flemming, of the Department of Health, Education and Welfare, is expected to present examples of just such minority action that has prevented the fluoridation of water supplies in many communities.

Three separate groups oppose fluoridation, according to the U. S. Public Health Service.

1. Those who oppose the measure because of personal anxieties aroused.
2. Those who acquire social status, political gain, or personal profit by opposing it.
3. Those who are fearful of change and suspicious of authority.

These persons can exert their will at the polls where their votes outnumber the majority who are in favor of fluoridation but who are also to apathetic to get to the polls and cast an affirmative vote, Dr. Galagan pointed out.

Water fluoridation is simply the adjust-

ment of the fluoride content of a water supply to a level that will reduce the amount of new tooth decay.

Since 1945, when fluoridation was introduced on an experimental basis, more than 1,500 cities have instituted the procedure, Dr. Galagan reported. A total of more than 32,000,000 people are now using water that has been adjusted for its fluoride content. This includes many major cities such as Chicago, Philadelphia, St. Louis, Baltimore, Washington, San Francisco and Indianapolis.

Yet, a total of 78,000,000 people reside in communities where there is no fluoridation. Objections to fluoridation, however unfounded, or unrealistic, strike a sympathetic chord in a sizable number of people. Most of the "scientists" who come before administrative or legislative bodies in opposition to fluoridation have little or no standing in their profession, Dr. Galagan pointed out.

Dr. Galagan charges opposition groups beat the indifferent or uninterested affirmations at the polls and that these chronic opposers prevent communities from sharing the benefits of a tried and approved dental health measure.

The Public Health Service researches show that flouride strengthens the teeth of children and thereby helps prevent decay and loss of teeth. The benefits continue into adulthood, resulting in better teeth for life.

Recent data on numbers of teeth saved, even in communities where fluoridation has been in operation for as little as four years, indicate that reduction in the number of decayed teeth may be greater than the 65% predicted in the early days of the program.

Science News Letter, January 17, 1959

## ASTRONOMY

## Russians Send Rocket Orbiting Sun

► THE "COSMIC ROCKET" launched by the Soviet Union in early January, is now the first man-made planet, orbiting the sun. (See p. 41.)

The rocket, according to Russian radio reports, was a multi-stage one that weighed in its final stage, without fuel, 3,245 pounds. Instruments designed to measure cosmic rays, the amount of gas in interplanetary space and the impact of solar particles as well as the measure of the moon's magnetic field (if one exists), weighed a total of 796.5 pounds. Coded messages were sent by several radio transmitters in the "planet," sending in the 20 megacycle region and one sending on the frequency of 183.6 megacycles.

Speed of the rocket at the time it escaped the pull of the earth's gravitational forces was said to be seven miles per second.

A special timing device, designed to release sodium vapor in space so that the rocket could be tracked visibly by scientists, was reported to have resulted in a Russian photograph of the sodium cloud.

The cosmic rocket passed within about 5,000 miles of the moon on Jan. 3, and entered its sun-circling orbit on Jan. 7.

Science News Letter, January 17, 1959



**TOOTH DECAY RESEARCH**—White rats contribute saliva samples for research into the causes of tooth decay. Although not an essential cause, saliva is believed to contribute to tooth decay along with heredity, age, bacteria, diet and other factors. A 21-year-old project sponsored by the U.S. Public Health Service is being conducted at Michigan State University by Drs. Harrison R. Hunt, Carl A. Hoppert and Samuel Rosen.

## NUTRITION

# Good Diet Gives Vitamins

► MOST PEOPLE can receive enough vitamins from a proper diet. They do not need extra vitamin preparations, the council on foods and nutrition of the American Medical Association stresses.

The council criticizes some national surveys which indicate that some people suffer from vitamin deficiencies because they do not receive sufficient varieties of food.

Vitamin pills or other preparations are unnecessary for individuals who maintain a diet that meets the recommended dietary allowances developed by the food and nutrition board of the National Research Council, the AMA council states in the *Journal of the American Medical Association* (Jan. 3).

In fact, an extra dose of vitamins A or D can cause serious harm, the council points out.

"Generalization of survey findings as a basis for vitamin supplementation of healthy individuals is not rational. The methodology employed in these surveys and the standards used for interpretation have

varied considerably. It is necessary for the physician to evaluate each person individually," the council says.

Vitamins are essential nutrients, and their usual source is food. All of the nutrients essential to maintain health in the normal individual are supplied by an adequate diet.

The AMA council did agree, however, that there are some situations where vitamin supplementation is both necessary and desirable. It may be useful during periods of illness or a deranged mode of life that may result in impairment of absorption of nutrients or deterioration of dietary quality. Some babies also need supplements, they point out.

In conclusion, the council stresses that public health will best be served by insistence on a factual basis for vitamin supplementation and therapy. It is sound judgment to emphasize repeatedly that properly selected diets are the primary basis for good nutrition.

Science News Letter, January 17, 1959

results were rings with steep inner edges and less steep outer edges. Sometimes a small "pimple" remained in the center, similar to those in a number of moon craters.

They remarked that the moon's loose, sandy surface is congruous with their theory. It would not be necessary to have the high subsurface temperatures that are usually associated with volcanic activity.

Drs. Gaydon and Learner believe that the meteorite theory does not explain circular craters in cases where the surface is struck at an angle rather than head-on. Such craters should be oval in shape, they report in *Nature* (Jan. 3).

Science News Letter, January 17, 1959

## ROCKETS AND MISSILES

## Ion Rocket Seen Practical For Interplanetary Trips

► AN ION rocket powered by a nuclear reactor is a "practical" method for travel between earth and planets, Dr. T. Merkle of the University of California Radiation Laboratory, Livermore, reported.

The rocket would have to start on its interplanetary trips from an orbit far above the planet's surface because the ions would not give it sufficient thrust to climb through the earth's atmosphere, he told the American Nuclear Society meeting in Detroit.

The ion rocket could, however, give very slight thrusts of about one-thousandth of a "g," or a thousandth the pull of gravity at the earth's surface. Dr. Merkle illustrated the use of milli-"g" systems as follows:

"Suppose we lived on a perfectly smooth planet with no atmosphere. Then if a frictionless railroad could be constructed on a great circle and a milli-'g' rocket mounted on a car on that path, in due course the velocity could be built up to 'surface satellite' velocity."

"From that time onward an ever increasing adiabatic (without gain or loss of heat) expansion of the orbit would occur. Thus a milli-'g' system could go anywhere providing the energy supply held out and the passengers did not die of old age."

Technical problems being explored in the development of a nuclear reactor for rocket propulsion and some problems that must be overcome before space travel becomes a reality were reported by Dr. R. E. Schreiber of the University of California's Los Alamos Scientific Laboratory. Dr. Schreiber heads the division concerned with Project Rover, the program to develop a nuclear rocket propulsion.

One major problem to be licked is to develop materials that can withstand temperatures of more than 3,600 degrees Fahrenheit. A nuclear reactor for a rocket would be run at high power densities, which means high heat fluxes and a serious thermal stressing problem. It would be possible to burn up the reactor in a few minutes if the coolant or propellant flow and power are not carefully balanced, Dr. Schreiber said.

Some of these problems may be answered by the Los Alamos Kiwi-A reactor now at the Nevada Test Site.

Science News Letter, January 17, 1959

## BIOCHEMISTRY

# Chemical Energy for Body

► A "PRECISE chemical mechanism" has been proposed as the key to how the living organism converts food to chemical energy.

It is the pyridine nucleotide cycle, Dr. Theodore L. Bieber of the University of Mississippi said. The pyridine nucleotides, which are substances of widespread biological occurrence, apparently play a crucial role in the hydrogen transfer needed to make ATP.

It is the chemical energy of ATP, or adenosine triphosphate, that provides the living organism with the "ready cash" of energy needed to function properly, the chemist explained.

In the pyridine nucleotide cycle, ATP molecules are generated with the movement of hydrogen atoms in the so-called respiratory chain. The nucleotides do not undergo

any permanent changes in the cycle, but are regenerated thus providing a continuing source of ATP.

Considerable experimental evidence is presently available for the pyridine nucleotide cycle, Dr. Bieber told scientists at the American Association for the Advancement of Science meeting in Washington. Studies of the living cell indicate that the chemical processes occurring can be explained by this mechanism.

"If it should be definitely confirmed," Dr. Bieber concluded, "then a major biochemical mystery would be solved, and research for the conquest and prevention of the deteriorative diseases, such as cancer, could be conducted on a more rational basis and hence with greater confidence."

Science News Letter, January 17, 1959

## GEOPHYSICS

# Propose Crater Theory

► HUGE BUBBLES of gas bursting through the moon's surface may be the cause of lunar craters.

Two British scientists proposed in a new "blow-hole theory" that gases trapped under the surface when suddenly set free would form craters resembling those observed on the moon.

Among other current theories are those attributing the formation of craters to meteorite impacts and volcanoes.

The scientists, Drs. A. G. Gaydon and R. C. M. Learner of the department of chemical engineering, Imperial College of

Science and Technology, London, say recent reports of volcanic activity on the moon stimulated them to develop their theory.

Some years ago, Dr. Gaydon had observed blow-holes forming as he was evacuating gas from a flask containing magnesium carbonate. It appeared that trapped gas burst through the carbonate surface leaving patterns of rings that closely resembled lunar craters.

With the help of Dr. Learner, he continued his flask experiments varying the air flow through the carbonate and other powdery substances. In many cases, the

## GEOGRAPHY

# Russians Chart Coast

**Armed with modern instruments and qualified personnel, Russian scientists are attacking the problem of charting their coast lines, sounding harbors and taking aerial photos.**

► THE RUSSIANS are showing an increased concern about the importance of charting their coast lines.

Their Naval Hydrographic Service, whose operations were almost at a standstill between the turn of the century and the second World War, is now more active than at any time in its history, and little doubt remains that the Russians will continue to step up this activity.

According to a former Soviet naval officer, the Russians have, since World War II, made aerial photographs of all coastal regions, published maps of these areas to a scale of 1:25,000, and sounded all little-known harbors, bays, anchorages and mooring points in Soviet waters. The writer's comments, made under a pseudonym, appear in the current *Bulletin of the Institute for the Study of the U.S.S.R.*, published in Munich, West Germany.

The Russian Naval Hydrographic Service, say the former officer, is kept well supplied with qualified men at all levels. Hydrographic units and ships have few sailors and petty officers, with responsible positions going to regular military personnel. The greater part of the crew or working force is made up of civilian personnel.

A drawback to personnel efficiency with the service is the fact that the head of a

regional hydrographic service is subordinate both to the head of the fleet service and to the naval base commander.

The sore spot in the Hydrographic Service, says the author, is the age of its ships, whose slow speeds lead to numerous accidents.

The reverse is true, however, in regard to equipment. The Service has the most up-to-date instruments, partially because of its influence on the work of many naval research institutes and the Krylov Engineering Academy, the center of Soviet naval engineering.

The Hydrographic Service maintains close liaison with the fleet headquarters, naval intelligence and the civilian-operated Hydrographic Administration of the North Sea Route, situated in Leningrad.

Development of the latter organization is being given special attention in view of the constantly increasing strategic importance of the northern regions.

In fact, says the author, there is a tendency within the Hydrographic Service to reduce activity in those areas that are comparatively compact and vulnerable in the event of an atomic war, such as the Black and Baltic Seas, and to increase activity in the northern and Pacific areas.

Science News Letter, January 17, 1959

## IMMUNOLOGY

# Salk Advises Fourth Shot

**The present inadequate protection afforded by commercial preparations of polio vaccine may be compensated for by a fourth polio inoculation, Dr. Salk suggests.**

► POLIO vaccine that is not as potent as Dr. Jonas Salk's laboratory preparation may be responsible for the crippling that occurred in persons who contracted polio even after receiving three inoculations.

This was suggested by Dr. Salk. Therefore, he has recommended a fourth polio shot until commercial preparations can be produced at optimal potency. Dr. Salk, of the University of Pittsburgh, spoke at a symposium at Ann Arbor, Mich., conducted by the National Foundation and the University of Michigan School of Public Health.

But the fourth shot is meant to be a temporary measure only. When the potency of commercial vaccine can be increased to the point where three injections will give complete and lasting protection against paralytic polio, there will be no need for a booster shot, the scientist said.

Dr. Salk told his audience that the po-

tency of commercial preparations could be raised to match his laboratory vaccine. Commercially prepared vaccines range in their degree of effectiveness and potency. Because of the wide differences, a fourth shot of the particular commercial preparation an individual had had previously, would be desirable.

This might be expected to compensate, in a great many instances, for the deficiencies in protection that sometimes remain after persons are given three injections, he pointed out.

Vaccine effectiveness now ranges between 70% and 90%, the standard set by the National Institutes of Health's division of biologic standards. Dr. Salk's vaccine is 100% effective. There had been some doubt that any vaccine could be used at 100% potency, but these views are now being re-examined, the scientist said.

Dr. Salk said the ideal vaccine would be such that a single shot would be effective with most persons. The second shot would offer the added measure of antibody stimulation for those not adequately protected by the first.

Ideally, the third shot would then provide long-lasting immunity.

Diverting from the subject of those persons who have received three shots, Dr. Gordon Brown of the University of Michigan said at the symposium that a big problem still to be faced is the number of persons who have received no shots at all.

"While a fourth dose of vaccine would undoubtedly be beneficial to some individuals . . . in view of the evidence from our Detroit epidemic studies, it is quite clear that what is most needed is complete immunization of the large number of persons of all ages who have not as yet had any vaccine at all," he said.

In 1958 alone, the city of Detroit reported 625 cases, 50% of which were paralytic. Today, some 50,000,000 Americans who are within the polio-susceptible age group, walk the streets unaware or unconcerned that they have had no polio protecting shots.

Science News Letter, January 17, 1959

## METEOROLOGY

# Rocket-Camera Takes 1,000-Mile Cloud Photo

## See Front Cover

► CLEAR PICTURES of a 1,000-mile-long stretch of atmosphere were obtained from the first combination rocket-camera unit designed to photograph cloud formations associated with hurricanes and weather frontal systems from extremely high altitudes.

The unit is for use over ocean areas where there are no permanent weather stations. The film was recovered at sea from the nose cone of a rocket that soared to an altitude of slightly more than 86 miles on Dec. 5, 1958. It shows the frontal cloud formations over an Atlantic Ocean area, starting at approximately 200 miles offshore and stretching to approximately 700 miles farther seaward.

The photograph on the cover of this week's SCIENCE NEWS LETTER is a mosaic strip that covers approximately 750 miles in length, comparing roughly with the expanse between the southern tip of Maine and the top of Florida. The strip is made up of only five photographs.

The rocket launch was made from the National Aeronautics and Space Administration's Pilotless Aircraft Research Station, Wallops Island, Virginia. It was one in a series of firings under the project Hugo program, conducted by the Office of Naval Research with financial assistance from the Bureau of Aeronautics and the U. S. Weather Bureau. The program is designed to promote research into weather phenomena in order to improve the accuracy of weather predictions.

Other rocket shots are planned.

Science News Letter, January 17, 1959

## MEDICINE

**Find Fats in Vessels Of Atherosclerosis**

► THE FATTY deposits that line the blood vessels of persons with atherosclerosis are not always the same, a team of Dutch researchers reports.

There are differences in the amount and kind of fat, or lipids, according to whether the lipid deposits appear in the aorta, the coronary arteries or the circle of Willis (the circular system formed by several cerebral arteries and the internal carotid or neck arteries).

Although the condition of the aorta is a guide to the progress of the disease, the scientists say in *Nature* (Jan. 3), atherosclerosis is "most liable to result" in dysfunction in the smaller arteries. With improved techniques for separating small amounts of tissue fats, the scientists report, they were able to analyze the composition of lipids from different blood vessels.

The coronary arteries have a high percentage of triglycerides compared with the aorta. The circle of Willis, in contrast, has a comparatively high content of cholesterol esters and an extremely low level of free cholesterol.

As a result of these studies, the scientists conclude, "theories concerning atherosclerosis based on observations of the aorta may have to take into account extra factors when they are applied to other arteries."

C. J. F. Bottcher, F. P. Woodford, C. Ch. Ter Haar Romeny, E. Boelsma and C. M. Van Gent, all of the department of physical chemistry, University of Leyden, The Netherlands, reported the research.

Science News Letter, January 17, 1959

## MEDICINE

**Scientists Disagree On Radiation Effects**

► THERE IS STILL disagreement among scientists concerning the relationship between radiation dosages and the incidence of leukemia, according to a report delivered by a six-committee council.

A group of scientists reporting for the United Nations has agreed there is either a straight linear effect of radiation exposure or a "threshold" minimum dosage that will induce leukemia, or cancer of the blood, as it is sometimes called. The linear effect refers to a direct increase in damage to the blood as dosage increases.

But a six-committee council of the National Academy of Sciences-National Research Council on the biological effects of atomic radiation has suggested other relationships.

They propose that any leukemia induced by radiation is due to a number of variables, which may include either dose effect proposed by the U.N.

The committees said they were inclined to view many forms of cancer, including leukemia, as changes that arise through a more or less complex series of responses.

Knowledge to date is too incomplete to

permit an accurate estimate of the number of cases of radiation-induced leukemia, bone cancer or other types of tumors, the six-committee report stated.

There is perhaps too great an impression created that leukemia is an inevitable result of radiation, neglecting the fact that leukemia develops in only a fraction of radiologists who are heavily exposed by occupation.

More and wider research, including compilation of data, will be necessary before any definite relationship can be determined, the committee members reported.

Science News Letter, January 17, 1959

## BIOLOGY

**See Success in Forecasts Of "Red Tide" in Florida**

► SOON FLORIDIANS may be able to protect themselves against killer "Jim Brevis."

In outbreak years, a "red tide" of *Gymnodinium breve*, or "Jim Brevis" as it is known to local residents, hits the West Florida beaches, causing huge losses to resort owners and fisheries.

A complicated formula using oceanographic and weather data may help forecast conditions needed for the explosive expansion of the microscopic plant-like organisms that kill millions of fish and fill the air with an irritating "gas."

Now it may be possible to predict the oncoming tide months in advance, Dr. F. G. Walton Smith of the International Oceanographic Foundation, Coral Gables, Fla., said.

"Once the probable time of an outbreak is known," said Dr. Smith, "it probably will be possible to devise methods of poisoning the waters to prevent the organism's explosive expansion."

In one pint of sea water there have been found as many as 60,000,000 of the tiny plants—described as "a four-lobed blob of almost naked protoplasm with a whiplike flagellum trailing from one end."

Oval-shaped, pigment-carrying bodies within the plant give it color. Because of a slimy substance secreted from its surface, the plant turns water into a thin syrup when present in huge concentrations as in a red tide.

An irritating "gas" is also produced when the organism is present in large numbers. Samples of sea water from a red-tide outbreak were heated nearly to the boiling point. The vapor given off caused sneezing and coughing. The same effect is produced by small particles thrown into the air by breaking waves and remaining in suspension for some time.

Apparently an outbreak depends on precisely the right mixture of Gulf of Mexico waters with fresh water at just the right temperatures. When these occur, a red tide is likely to take place.

It will probably be necessary to include ocean tidal movements in the forecast formula before predictions can be entirely relied upon, Dr. Smith says in an article published in the annual report of the Smithsonian Institution.

Science News Letter, January 17, 1959

## IN SCIENCE

## PUBLIC HEALTH

**Radioactive Strontium In Milk Shows Rise**

► LEVELS of strontium-90 in milk increased slightly during last September in eight of ten sampling stations, the Public Health Service has reported.

However, the increases were within the range of normal month-to-month fluctuations and well below the levels considered by the National Committee on Radiation Protection and Measurements to be permissible for human consumption.

The September count was highest at the St. Louis station, with 15.4 micromicrocuries per liter. A curie is equal to the amount of radioactivity produced by one gram of radium, and a micromicrocurie is one-millionth of a millionth of a curie. The Sacramento, Calif., station, with 3.8, had the lowest September count.

Of the other eight stations, the levels were up in Atlanta, Ga.; Austin, Tex.; Cincinnati, Ohio; Fargo, N. D.; New York, N. Y.; Salt Lake City, Utah; and Spokane, Wash. The other station reporting a decrease was Chicago.

The committee currently considers that a lifetime of exposure to strontium-90 at an average level of 80 micromicrocuries per liter is not expected to cause appreciable bodily injury to a human being.

Strontium-90 is one of the products released into the atmosphere during the explosion of nuclear weapons.

Average samplings at all stations for the 12 months ending September, 1958, showed the strontium-90 level ranged from 4.2 to 11.2 micromicrocuries.

The milk-sampling network also measures four other radioactive elements in milk: iodine-131, strontium-89, barium-140 and cesium-137. Levels for these elements have shown a generally variable pattern even further below the current permissible levels.

Science News Letter, January 17, 1959

## GEOPHYSICS

**Map Drawn Showing Underside of U.S.**

► BY PLOTTING earthquake waves so long they drag on the bottom of the earth's crust, scientists at Columbia University and the California Institute of Technology have drawn the first generalized map of the underside of the United States.

It shows how this country would look if the top layers of earth and rock to a depth of about 20 miles, the earth's crust, were reversed. The bottom of the continental crust, the geophysicists found, mirrors the surface. It appears to have projections and depressions that in a general way reflect the larger topographic features of the land surface.

Science News Letter, January 17, 1959

# CE FIELDS

## METROLOGY

## English-Speaking Nations Agree on Measurements

► A NEW VALUE for the international yard and pound have been adopted by the English-speaking nations. The revised definitions will become effective July 1, 1959.

The new international inch, derived from the international yard, is equal to 25.4 millimeters. The inch presently used by the National Bureau of Standards is equal to 25.4000508 millimeters. The new international yard equals 0.9144 meter.

The revised international pound is equal to 0.45359237 kilogram, compared with the presently used pound equal to 0.4535924277 kilogram.

Although these differences will have little effect on the day-to-day transactions with which most persons are familiar, the new definitions will be extremely important in the precise measurements of science and technology.

The directors of standards laboratories for the U. S., Canada, New Zealand, the United Kingdom, South Africa and Australia agreed to use the international units for all calibrations carried out by them after July 1.

The international inch is approximately two parts per million shorter than the inch presently used by the National Bureau of Standards, and somewhat less than two parts per million longer than the inch now used by the U. K.'s National Physical Laboratory.

The value of the international grain, a common unit in avoirdupois, apothecary and troy pounds, is 0.06479891 gram. There are 7,000 grains in the avoirdupois pound and 5,760 grains in both the apothecary and troy pounds.

Science News Letter, January 17, 1959

## MEDICINE

## Dyes Aid Treatment Of Throat Cancer

► BETTER METHODS in the surgical treatment of throat cancer may result from the use of dyes and radioactive solutions which serve as "pathfinders" for the surgeon's knife.

A research team at the University of California at Los Angeles Medical School has explored tissue pathways in the larynx in an effort to see how cancer spreads.

The larynx was demonstrated to consist of several isolated compartments with complete isolation, except for the surface mucous membrane, of one side of the larynx from the other.

When isotopes are injected into one side of the larynx a small portion enters the general circulation. The major fraction remains at the site of injection or in the

regional lymph nodes. None appears in the uninjected side of the larynx.

These observations correspond to behavior of many larynx cancers in which enormous tumors occupy one side of the larynx without involvement of the other.

Results of the study may enable doctors to accurately predict the route of spread of cancer in the larynx. Thus the surgeon may be guided as to surgical procedures to be employed.

The team consists of Dr. Joel Pressman, Dr. Andrew Dowd, Dr. Raymond Libby, Max Fields, Mildred B. Simon and Katherine Hand. The research is being supported by the U.S. Public Health Service.

Science News Letter, January 17, 1959

## MEDICINE

## Encourage Plant Research In Cancer Therapy

► SOME OF THE plants being grown in American gardens may be promising cancer fighters.

Research with some 96 plant extracts including 91 species indicate these naturally occurring compounds have "anti-cancer possibilities." This was reported to the University of Texas School of Medicine by Usha C. Dalal, Alfred Taylor and George F. McKenna of the University.

Extracts from 32 species inhibited the growth of egg-cultivated tumors 55% to 100% as compared with water-treated controls, the three researchers say.

Five species in the legume family, including the sweet locust and the white popinac, gave extracts which inhibited tumor growth 63% to 95%. The next greatest inhibition, 67% to 90%, came from the *Anacardiaceae* family which includes the pistachio nut tree. Extracts from the *Compositae* family inhibited tumor growth 55% to 70%. Plants tested in this group included the bur-marigold, plumed thistle, climbing hempweed and rosinweed.

Cherry palm, forsythia, cypress pine, soap berry, Japanese persimmon tree, and Indian or mock strawberry also yielded tumor-inhibiting extracts.

"None of the plant extracts processed to date have given results which promise practical application to cancer chemotherapy," the scientists warn. Some of the extracts are effective up to a certain extent, however, and need further attention.

Their data, they suggest, should encourage further work in this field.

As yet, the scientists point out, there is not a "single chemical agent which will completely inhibit the growth of or destroy tumor tissue without causing undue disturbances to nontumor tissue." Since plants have given potent medicines for other diseases, the researchers say, they may be useful in cancer therapy.

The full scientific report appears in the winter edition of *Texas Reports on Biology and Medicine* published by the University's Medical Branch.

Science News Letter, January 17, 1959

## MEDICINE

## Citrus Fruit Helps Football Players Ward Off Bruises

► ORANGES may help the football player become a great hero.

It seems that a combination of citrus fruit derivatives, hesperidin and vitamin C, combats the bruising a football player ordinarily experiences during a game. Dr. Thomas F. Dowd, attending physician to the Philadelphia Eagles, said the watchword in sports medicine must be to prevent injuries before they occur.

Dr. Dowd said he noticed professional football players became badly bruised during the course of a game. About 40% of players will show large bruises, 55% will show smaller bruised areas and the remaining five percent will escape bruising.

In sports, healing must be speeded as fast as possible, the physician pointed out. So he began experimenting with citrus fruit derivatives. Each player now takes three capsules of the derivatives a day.

There are now large bruise areas in less than five percent of the players at post-game examination, he said. No controlled physiological studies to confirm that the vitamin combination strengthens the capillaries have yet been done by the doctor. A bruise is essentially a mass of broken or damaged capillaries.

Dr. Dowd spoke during a symposium on Stress and Circulation sponsored by the Wayne County Academy of General Practice, Detroit.

Among other problems, the most serious were injuries to the knee joint involving ligament tears.

Science News Letter, January 17, 1959

## ASTRONOMY

## First Artificial Planet Now Lost for Many Years

► THE SOLAR system's newest planet, Russia's rocket "Mechta," is now lost for many years in the future. (See p. 37.)

The baby planet, known as an asteroid to astronomers, is much too small and faint to be picked up by earthly telescopes, even by the giant 200-inch reflector atop Mt. Palomar, when Mechta makes its closest approach to earth some 15 months hence.

The smallest asteroids now observable are about a mile in diameter. At closest approach to earth these faint points of light move so swiftly across the heavens that they can easily be missed. Because Mechta is so much smaller and, therefore, fainter, it is highly probable that the first artificial planet will also be lost, wandering unrecorded in space.

Improved observational methods might bring into view in the future considerably fainter objects than can now be photographed. However, the chances are still high that Mechta would be found, if at all, only by chance, because its orbit through space was not determined sufficiently accurately before its radio went dead.

Science News Letter, January 17, 1959

## PHYSICS

# Silent Sound

**Ultrasonics has found countless applications in research, medicine and industry; despite its already widespread use, its potential is far greater.**

By RICHARD LITELL

► SOUNDS PITCHED so high that you cannot hear them are finding applications in almost every science and industry in the nation. Despite the widespread public attention focused on the latest developments in nuclear energy and the conquest of space, ultrasonics remains one of the magic words in 20th century science.

Ultrasonics refers to the study and use of high-frequency, inaudible sound waves. These waves have been referred to as "silent sound" or high-frequency vibrations, for how can they be sound when there is no sound to hear?

Call them what you will, these ultrasonic waves have been used to tenderize meat, make facial creams, clean and degrease precision tools, mow lawns, age whisky, detect submarines and cut jewels. And that is not all. They have also been used in industrial drilling and grinding, in speeding up chemical reactions, in emulsifying and homogenizing materials, in removing barnacles from the hulls of ships, and in burglar alarms, to say nothing of numerous applications in medicine and dentistry. And that is still not all. One could go on all day listing applications of ultrasonics.

A look at the nature of sound waves as related to the human ear may lead to a better understanding of ultrasonic waves.

Basically, sound consists of a series of alternate increases and decreases in pressure, similar to the ripples caused by throwing a stone into a still pond. The frequency, or pitch, is determined by the number of times the pressure increases or decreases; it is measured in cycles per second. Intensity, on the other hand, expresses the varying strengths of this pressure, and is measured in decibels.

## Speeds and Vibrations

The word supersonic, often used interchangeably with ultrasonic, more correctly applies in current usage to speeds higher than the speed of sound. Sound travels at about 741 miles per hour at 32 degrees Fahrenheit at sea level. Ultrasonic, on the other hand, refers to frequency of sound waves.

The average person cannot hear frequencies of less than 16 vibrations a second or more than 15,000 to 20,000 vibrations a second. Similarly, the human detection range of intensity is from zero to 120 decibels. That is, any intensity above 120 decibels becomes painful.

No matter how loud a sound is, it cannot be heard unless it lies in the audible frequency range, because the limit of audi-

bility is set by the frequency and not by the intensity. Thus it is possible to have silent, inaudible sound of very high intensity.

Try moving your hand rapidly back and forth in front of your face. You are now setting up vibrations in the air, yet you do not hear them. This is because the vibrations are too slow, less than 16 a second.

If you could vibrate something in front of you at a frequency greater than approximately 17,000 vibrations a second, you would not hear anything either, because the sound would be at the other extreme of inaudibility to the human ear.

To take an everyday example of ultrasonics, consider the dog whistle that can be heard by a dog but not by any person. The vibration frequency of the whistle is pitched too high for the human ear to detect it. But a dog, which can detect frequencies up to about 35,000 per second, both hears and responds.

For ultrasonics' surprising ability to accomplish easily formerly difficult tasks, it is necessary to obtain a sound intensity sufficiently high to produce a secondary effect known as cavitation. This is essentially the creation and collapse of millions of tiny vapor bubbles in the medium through which the sound is traveling.

In cavitation, instantaneous pressures as high as 75,000 pounds per square inch, 5,000 times greater than normal atmospheric pressure, can be created. Along with these pressures are localized temperatures as high as 20,000 degrees Fahrenheit—above that of the sun's surface. A thin aluminum foil subjected to cavitation in ordinary tap water can be literally chewed to pieces within a few seconds.

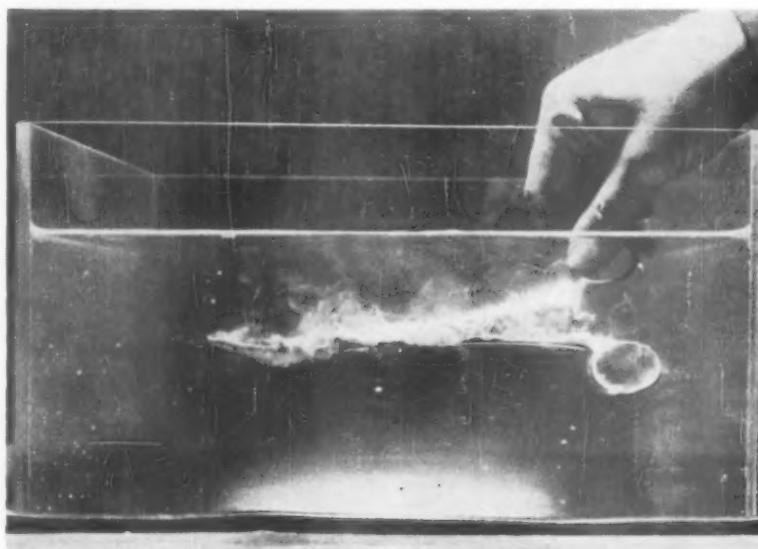
In order to produce ultrasonic waves, electrical energy must be changed into mechanical sound vibrations by such devices as quartz crystals or transducers. With quartz crystal vibrators, sounds a thousand times as intense as a violent crack of thunder have been produced.

## Applications of Ultrasonics

By using frequencies between 35,000 and 50,000 vibrations a second, cosmetic manufacturers can surround a particle of water with oil to make a cleansing cream, or surround a particle of oil with water to produce a vanishing cream.

An ultrasonic tenderizing process that breaks up tough fibers in frozen foods is said to cause no taste or color change in meat, fish, fruits or vegetables. The frozen food is immersed in a brine-filled tank and then subjected to vibrations varying from 1,000 to 1,000,000 cycles a second through the use of a transducer. The freezing guarantees retention of the original shape and natural juice of the food.

An ultrasonic washing machine for cleaning soiled surgical instruments far more



**ULTRASONIC WASHING**—Dried blood and other soils fly away from this surgical instrument immersed in a tank of ultrasonically radiated water. Cavitation effect of powerful, inaudible sound waves does a faster, easier and more thorough job than conventional hand brush and scrubbing.

speedily and thoroughly than ever before is probably the forerunner of an ultrasonic home dishwasher. Within such washing machines, the penetrating energy of high-pitched waves loosens and disintegrates dirt, dried blood, bits of tissue and other foreign material, even that packed into microscopic holes. One hospital has reported an 80% saving in time for cleaning instruments with ultrasonic washing machines. Experimental models of ultrasonic kitchen sinks have also been demonstrated.

Minute particles of soot from industrial stacks, normally too tiny to be caught by ordinary collection methods, have been made to form into large clumps and subsequently captured by sound vibration of high frequency. In this way the carbon is saved and the countryside freed of soot.

In a similar manner, ultrasonic waves have been made to condense fog by causing the tiny water droplets to gather together and fall as water.

Applications that perhaps affect the public most directly are the medical ones. For example, ultrasonic energy has been successfully used to diagnose lumps in the human breast and tumors in the brain. When a narrow sound beam encounters human tissue, a pattern of echoes is returned, converted into electronic signals and displayed on a television picture tube. Irregularities such as cancer, nonmalignant solid tumors and liquid-filled cysts can thus be recognized from their characteristic pictures, and appropriate treatment can be initiated.

#### Sound Waves Take Pictures\*

Ultrasound may also supplement X-rays as a diagnostic aid. High-pitched sound waves have been used to take pictures of bones and other body parts. The device used consists of a plastic tank filled with water in which the object to be viewed is suspended, crystals to direct ultrasonic beams onto the object and a sonic lens that forms a sound image of the object on another crystal. The image can be formed either by reflected sound waves or by those that have passed through the object.

A recently developed technique makes it possible to examine areas of the eye which were formerly too difficult to reach. Now ultrasonics makes possible a cross-sectional view of the eye and the areas behind the eye.

Medical applications of ultrasonics, however, are still not too widespread as much remains to be learned about the effects of high-pitched waves on animal tissue. The same range of frequencies that makes cleansing creams and vanishing creams, for example, also can clot blood.

Though the future of ultrasonics in medicine seems much more likely to be directed to saving human lives than toward destroying them, the fact remains that ultrasonic waves improperly used can be death-dealing. A great deal must still be learned about their effect on body tissues before they can be used extensively in all their promising applications.

Today, despite its tremendous potential and already widespread use, ultrasonics is only beginning to assume the important role that many foresee for it in industry, research and in the home.

Science News Letter, January 17, 1959

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# Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D.C. Request free publications direct from publisher, not from Science Service.

**A-C CIRCUIT ANALYSIS**—Alexander Schure, Ed.—*Rider*, 95 p., illus., paper, \$1.80. For students of technical institutes, laboratory workers and technicians.

**ADVANCES IN CARBOHYDRATE CHEMISTRY**; Vol. 13—Melville L. Wolfrom and R. Stuart Tipson, Eds.—*Academic*, 387 p., \$11. Contains chapters on the methyl ethers of the monosaccharides; the chemical nature of the sialic acids and the development of starch nitrate as an explosive.

**THE ATOM AND THE ENERGY REVOLUTION**—Norman Lansdell—*Philosophical Lib.*, 200 p.,

illus., \$6. A study of the implications of atomic energy.

**THE ATTACK ON AMERICAN SCHOOLS**—Hollis L. Caswell—*Teachers College*, 30 p., paper, free upon request direct to publisher, Columbia University, New York 27, N.Y. President's statement from the Annual Report, 1957-1958.

**BASIC KIT OF MATHEMATICS**: Geometry for the Young Scientists with The Story of Mathematics—Hy Ruchlis and Jack Engelhardt—*Harvey House*, 149 p., illus., paper, materials for creating mathematical forms, \$2.95. Contains compass, protractor, triangles, ruler and color pencils.

**CAREERS AND OPPORTUNITIES IN ENGINEERING**—Philip Pollack, introd. by John R. Ragazzini—*Dutton*, 140 p., illus., \$3.50. For those planning to enter the profession, the book discusses each of the branches of engineering.

**COMMENTS ON REACTOR DESIGNERS AND INDUSTRIAL REPRESENTATIVES ON THE PROPOSED EXPANDED CIVILIAN NUCLEAR POWER PROGRAM**—U.S. Congress, Joint Committee on Atomic Energy—*Govt. Printing Office*, 218 p., illus., paper, 55¢. Analyzes the technical progress needed to achieve economic nuclear power.

**ELEMENTARY PRACTICAL ORGANIC CHEMISTRY**: Small Scale Preparations, Qualitative Organic Analysis, Quantitative Organic Analysis—Arthur I. Vogel—*Longmans*, 890 p., illus., \$9.75. Complete textbook of elementary practical organic chemistry.

**EXTENSIVE AIR SHOWERS**—William Galbraith—*Academic*, 211 p., \$7.50. Monograph concerned with the incoming particles of great energy in cosmic radiation and their effects on the atmosphere twenty kilometers or so above the earth.

**THE FOUNDATIONS OF EUCLIDIAN GEOMETRY**—Henry George Forder—*Dover*, 349 p., paper, \$2. Reprint of 1927 edition.

**THE GREEN FLASH AND OTHER LOW SUN PHENOMENA**—D. J. K. O'Connell—*Interscience*, 192 p., photographs by C. Treusch, \$6. On the phenomenon sometimes seen at sunrise or sunset, illustrated with Vatican Observatory photographs.

**AN INTRODUCTION TO THE GEOMETRY OF N DIMENSIONS**—D. M. Y. Sommerville—*Dover*, 196 p., paper, \$1.50. Reprint of 1929 first edition.

**LANGUAGE AND PSYCHOLOGY**—Samuel Reiss—*Philosophical Lib.*, 299 p., \$3.75. On the nature of the language creating process and its relation to the communication of meaning.

**ON THE STRENGTH OF CLASSICAL FIBRES AND FIBRE BUNDLES**—B. D. Coleman—*Mellon Institute*, 11 p., paper, free upon request direct to publisher, 4400-5th Ave., Pittsburgh 13, Pa.

**PLANT HUNTERS**—Frances L. Jewett and Clare L. McCausland—*Houghton*, 230 p., illus. by René Martin, \$3. Describes the hazards and successes experienced by men whose lives were dedicated to the introduction and development of new plants.

**PROCEEDINGS OF A CONFERENCE ON RESEARCH AND DEVELOPMENT AND ITS IMPACT ON THE ECONOMY**—Nat. Science Foundation, introd. by Jacob Perlman—*Govt. Printing Office*, 223 p., paper, \$1.25. Conference investigated the relationship between research and development and the economic vitality of the U.S. economy.

**RAYS: Visible and Invisible**—Fred Reinfeld—*Sterling*, 204 p., illus., \$3.50. For the general reader.

**ROCKET PROPELLANTS**—Francis A. Warren—*Reinhold*, 218 p., illus., \$6.50. Basic information on both solid- and liquid-rocket fuel development.

**SCREENING PROCEDURES FOR EXPERIMENTAL CANCER CHEMOTHERAPY**—C. Chester Stock, Ed.—*N. Y. Acad. of Sciences, Annals*, Vol. 76, Art. 3, 561 p., illus., paper, \$5. Review of the state of knowledge in the field of anti-cancer screening.

**SPRING FLOWERS OF THE LOWER COLUMBIA VALLEY**—Clara Chapman Hill—*Univ. of Wash. Press*, 164 p., illus. by Mary Comber Miles, \$3. A regional handbook on spring-blossoming wild-flowers and shrubs.

**TRIGONOMETRY**—Dorothy Rees and Paul K. Rees—*Prentice-Hall*, 318 p., illus., \$3.95. Alternates numerical and analytical work, each chapter followed by summary and exercises.

**UNITED STATES COAST PILOT '5**: Gulf Coast, Puerto Rico and Virgin Islands—H. Arnold Karo, Dir.—*Coast and Geodetic Survey*, 4th ed., 286 p., \$2.50. Supersedes two 1949 editions in separate volumes.

**URBAN RESEARCH IN HIGHWAY PLANNING**—Paul C. Watt and others, introd. by Wilfred Owen—*Highway Res. Bd.*, Bull. 190, 40 p., illus., paper, 80¢. A study of how traffic and transportation affect the economic and social development of urban areas.

Science News Letter, January 17, 1959

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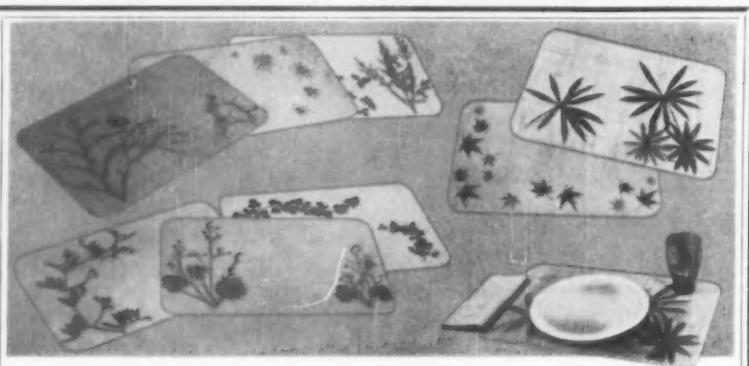
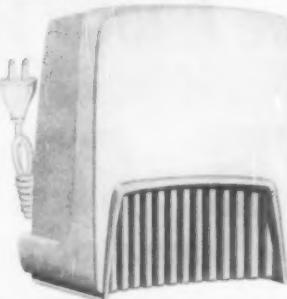
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Here is another one of Nancy Hutchings' enchanting screen designs. These were featured in the October 18, 1958 issue of Science News Letter.



### PHYSIOLOGY

## Pinpoint Calcium as Link In Muscle Contraction

► CALCIUM apparently acts as an essential link between the electrical and mechanical steps in muscle contraction.

By soaking frog skeletal muscle in calcium-free solutions, contraction was "consistently inhibited," Dr. George B. Frank of the University of Manitoba's department of pharmacology and therapeutics says. If the soaking continued as long as 12 minutes, he reports in *Nature* (Dec. 27), muscle contraction induced by potassium ions was always completely eliminated.

These results support the theory that electrical events such as depolarization at the surface of heart and skeletal muscle fibers permit or promote the entrance of calcium which then initiates the muscle contraction.

Science News Letter, January 17, 1959

## Questions

ASTRONOMY—What is the diameter of the smallest asteroids observable? p. 41.

BIOLOGY—What is the "red tide"? p. 40.

GEOPHYSICS—What are the thickest and thinnest earth crusts yet measured beneath the seas? p. 36.

METEOROLOGY—How far in advance have experimental weather predictions been made? p. 35.

METOLOGY—How does the new international inch compare with the presently used one? p. 41.

Photographs: Cover, U.S. Navy; p. 35, U.S. Army; p. 37, Michigan State University; p. 42, Acoustica Associates, Inc.; p. 48, Eastman Chemical Products, Inc.

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Science News Letter, January 17, 1959

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Science News Letter, January 17, 1959

**FISH-HOOK BOOT**, a small polyethylene plastic cylinder, shown in the photo-



graph, slips over individual barbs to keep points sharp, prevent tackle tangling, and make hooks safe to handle. The boot is squeezed between finger and thumb for easy removal.

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Science News Letter, January 17, 1959

**SPECIAL WELL-CENTER CAR** for standard 0-27 gauge model railroads is a close copy of real-life railroad car used by a heavy equipment manufacturer. The model car comes loaded with a plastic replica of a big shell of a condenser used to condense steam in power plants.

Science News Letter, January 17, 1959

## Nature Ramblings

By BENITA TALL

► WHEN YOU think of birds and their nests, those remarkable constructions of twigs, leaves, feathers, hairs and hundreds of other things, you think of springtime usually.

Leafy trees, tiny speckled eggs, parent birds hurrying to feed their young—all are associated with nests in the spring. Yet it is in the autumn and winter that birds' nests lose their anonymity. It is then that you can see details of shape, size and make-up newly exposed to view.

A walk through a marsh in winter or a woods where the trees have been stripped down to their bare branches will reveal birds' summer nesting sites by the dozens. Even if you are expert at identifying by sight the bird who built the nest, you may have a difficult time telling the name of the builder when he is no longer around.

### Winter Nests



Sometimes, however, it almost seems that the nest goes with the "personality" and looks of its maker.

Thus the bright yellow and black Baltimore oriole has the more exotic hanging nest, usually gourd-shaped with an inside depth greater than two inches, while the every-day robin builds a thick, mud-walled nest in a tree.

The crow builds itself a rough, bulky home. Made with sticks and twigs, the cup-shaped nest is lined with bark, grass, moss and roots. Ranging from one to two feet in diameter, this nest is usually built high in a tree, more than 30 feet up.

If, among some buildings or rocks, you see a gourd-shaped nest made with mud as the outer layer, you are pretty safe in saying a cliff swallow built it.

In sharp contrast to this nest are the dwellings of the yellow warbler, the redstart and the goldfinch. These are all cup-shaped, "felted" nests of cottony materials. While the cliff swallow's nest has a scanty lining, these birds line theirs with plant-fluff, fine grass, thistledown or hair.

Nest-hunting in winter can be an exciting adventure. Even the flicker's nest, an unadulterated hole in a tree, is somehow seen anew, simplified and fresh, without the trappings of spring.

Science News Letter, January 17, 1959

